

Atty. Docket No. PIA31180/DBE/US
Serial No: 10/750,248

Remarks

Applicant and his representatives wish to thank Examiner Webb for the thorough examination of the present application, and the detailed explanations in the Office Action dated January 23, 2007. The Examiner's concerns have been given serious consideration. However, the present claims are considered allowable over the cited reference.

Claim 9 has been amended. Claims 18-25 have been added. Claims 9, 11, 13, 15, and 18-25 are active in this application. No new matter is introduced by the present Amendment.

The present invention relates to a method for removing polymers generated during etching processes, comprising the steps of removing the polymers from a metal line, a via hole, or a pad open area by using an inorganic compound including DIW, H₂SO₄, H₂O₂ and HF; forming a protective oxide film on a metal line, a via hole or a pad open area by using H₂O₂; and protecting the metal line, the via hole or the pad open area by the protective oxide film while removing the polymers by using HF. DIW occupies by volume about 70.5% to about 80.5% by volume, H₂SO₄ occupies about 6.5% to about 8.5% by volume, H₂O₂ occupies about 15% to about 19% by volume, and HF occupies greater than 100 PPM to about 150 PPM by volume.

According to the present invention, the polymers are removed by using the above recited inorganic compound. It is believed that the references cited against the claims do not disclose removing polymers using an inorganic compound including about 70.5% to about 80.5% of DIW, about 6.5% to about 8.5% of H₂SO₄, about 15% to about 19% of H₂O₂ and greater than 100 PPM to about 150 PPM of HF. Accordingly, the rejections of the present claims are believed to be unsustainable.

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The Rejections of Claims 9-16 under 35 U.S.C. § 102(b)

The rejection of Claims 9-16 under 35 U.S.C. § 102(b) as being anticipated by Rath et al. (U.S. Pat. No. 6,630,074, hereinafter Rath) is respectfully traversed.

The present invention, as set forth in the amended independent claim 9, is directed to a method for removing polymers generated during etching processes using an inorganic compound including DIW, H₂SO₄, H₂O₂, and HF (see Claim 9 above). According to the present invention HF occupies greater than 100 PPM to about 150 PPM by volume of the inorganic compound (see, e.g., paragraph [0016] of the present specification).

Rath discloses aqueous solutions containing ranges of about 0.1 to about 100 PPM of a fluoride containing compound, preferably hydrofluoric acid (see, e.g., col. 3, l. 38 - col. 4, l. 7). Rath does not disclose a solution containing HF in a range of greater than 100 PPM and less than or equal to 150 PPM by volume. Therefore, Rath fails to anticipate the method of Claim 9, and the rejection under 35 U.S.C. § 102(b) should be withdrawn.

Claims 11, 13, and 15 depend from Claim 9, and thus include all of the limitations of Claim 9. Therefore, Claims 11, 13, and 15 are patentable over Rath for essentially the same reasons as Claim 9.

Conclusion

In view of the above amendments and remarks, all bases for rejection are believed to be overcome, and the application is believed to be in condition for allowance. Early notice to that effect is earnestly requested.

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If it is deemed helpful or beneficial to the efficient prosecution of the present application, the Examiner is invited to contact Applicant's undersigned representative by telephone.

Respectfully submitted,



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